SECTION 408
JOINT AND CRACK CLEANING AND SEALING

408.01 GENERAL: This item shall consist of applying herbicide and soil sterilant chemicals; routing, cleaning, placing filler material and sealing of cracks in asphalt pavements; and removing existing sealant, cleaning, placing backer rod and sealing joints in Portland Cement Concrete pavements, plus the routing and sealing of random cracks in Portland Cement Concrete pavements in accordance with project details and instructions from the Engineer.

408.02 MATERIALS: The materials to be used and the governing specifications are as follows:

A. Herbicide and Soil Sterilant Chemicals: The herbicide and soil sterilant shall be a mixture containing one chemical from each of the following groups (except where noted):

GROUP	COMMON NAME	QTY OF ACTIVE INGREDIENT REQUIRED
1	Dalapon Glyphosate	10 lbs. per acre 3 lbs. Per acre
2	Bromacil Prometon Hexazinone	6 lbs. per acre 20 lbs. per acre 6 lbs. per acre
3	A non-ionic surfactant containing poloxyethylene ether	2 qts. Per 100 gals. sprayable mixture

Listed below are trade names and rates of products which will provide the quantity of active ingredients required above. Similar chemicals will be acceptable when approved by the laboratory.

TRADE NAMES			
GROUP	TRADE NAME	RATE PER ACRE	MANUFACTURER
1	Dowpon M.	13..5 lbs.	Dow Chemical Co. Agricultural Prod. Dept. Midland, MI 48650
	Roundup*	3 qts.	Monsanto Co. MAP 800 North Lindbergh St. Louis, MO 63166
2	Hyvar Hyvar X-L Velpar Velpar L	7.5 lbs. 3 gals. 7 lbs. 3 gals.	E.I. DuPont DeNemours & Co., Inc. Sales Order Center Biochemical Dept. Wilmington, Delaware 19898

2	Pramitol 24E Pramitol 80%WP Ontract WE-2 Ontract 800	10 gals. 25 lbs. 10 gals. 25 lbs	Ciba-Geigy Corp. Agricultural Division Sawmill River Road Ardsley, New York 10502
3	Wet Aid	2 qts. Per 100 gals. sprayable mixture	Woolfolk Chemical Works, Ltd. P. 0. Box 938 Fort Valley, GA 31030
	X-77	2 qts. Per 100 gals. sprayable mixture	Chevron Chemical Co. Ortho Division 200 Bush Street San Francisco, CA 94120
	Surfactant WK	2 qts. Per 100 gals. sprayable mixture	E.I. DuPont DeNemours & Co., Inc. Sales Order Center Biochemical Dept. Wilmington, Delaware 19898

*When Roundup is used the surfactant (Group 3) may be deleted.

The chemicals shall be mixed at the specified rates using a minimum of 40 and a maximum of 100 gallons of water per acre unless directed otherwise by the Engineer.

B. Filler Material: The filler material shall be a uniform mixture of fine sand, fly ash, cement, emulsified asphalt, and water. Individual components of the mixture shall meet the requirements of appropriate department specifications. The components shall be proportioned to produce a uniform mixture capable of being pumped or poured directly into cracks and joints. The Contractor shall submit to the Office of Materials and Research, for approval, a design mix. Samples of the individual components shall also be sent to the Office of Materials and Research. The approved design will be transmitted to the Engineer by the Office of Materials and Research prior to the Contractor commencing work.

1. Filler Material Alternative: In lieu of the filler (slurry) specified in B. above, a single component, hot applied, elastically modified asphalt sealant meeting ASTM D5078 specifications may be substituted at no additional cost to the contract.

C. Bond-Breaking Adhesive Tape and Backer Rod: Bond-breaking adhesive tape and backer-rod shall be approved by the sealant manufacturer as being compatible with the joint sealant.

D. Joint Sealant Material: The joint sealing materials shall conform to one or more of the types listed below for all joints as specified by the Engineer.

1. ASTM D3405: Joint Sealants, Hot Poured, for Concrete and Asphalt Pavements

2. Low Modulus Silicone Sealant: Silicone sealant shall be a one part formulation and shall meet the requirements of Subsection 833.06 of the Georgia Dept. of Transportation Standard and Supplemental Specifications (for use on concrete pavements only).

408.03 EQUIPMENT: All equipment necessary for the proper accomplishment of the work must have the approval of the Engineer both as to type and mechanical condition before construction will be permitted to begin. The Contractor shall at all times provide sufficient equipment to allow continuous prosecution of the work and to insure equipment is capable of producing satisfactory work in compliance with standards set forth by this provision. All equipment shall be operated by experienced and capable workers.

The field installation equipment for hot poured joint sealant shall be capable of producing and maintaining a homogenous mixture at a uniform temperature without "hot or cool" spots in the mixture. The heating kettle shall be an indirect heating type, constructed as a double boiler. A direct connecting pressure type extruding device with nozzles shaped for insertion into the crack or joint shall be provided.

Air compressors used for cleaning joints shall be equipped with suitable traps capable of removing all surplus water and oil in the compressed air. The compressor shall be capable of delivering compressed air at a continuous pressure of at least 90 psi.

408.04 CONSTRUCTION:

PREPARATION AND SEALING OF CRACKS IN ASPHALT PAVEMENTS

A. Soil Sterilization: A minimum of two weeks prior to scheduling routing, cleaning, filling and sealing of joints and cracks, the Contractor shall apply a mixture of herbicide and soil sterilant chemicals to vegetated areas of pavements. If, at the time the Contractor plans to start cleaning operations, chemicals have not performed to the Engineer's satisfaction, a second application of chemicals shall be applied and the cleaning operations delayed until authorized by the Engineer.

B. Routing: Cracks having an average width opening less than ½ inch shall be routed to provide **a** minimum sealant reservoir of ½ inch wide and ½ to ¾ inch deep.

C. Cleaning: Joints and cracks containing visible soil and vegetation, joints and cracks routed, and other joints and cracks as directed by the Engineer shall be blown out using a power blower or air compressor to a depth satisfactory to the Engineer. Joints and cracks shall be free of vegetation, dirt, dust, moisture, and other foreign material. The pavement surface shall be kept clean to avoid re-entry of soil or other foreign material into the joints and cracks.

D. Filling: After joints and cracks have been satisfactorily cleaned, the filler material shall be pumped or poured into the joints and cracks having a depth of one inch or greater. Normally cracks of this depth will be ¾ inch or greater in width; however, joints greater than one inch in depth may be encountered with insufficient width to receive the filler material. These joints shall be widened as required.

The joints or cracks shall be filled from the bottom to a level which will provide a recess of approximately ½ inch below the pavement surface after filler material has settled. The filler material shall be allowed sufficient time to cure before joints and cracks are sealed. The Engineer shall determine when material has sufficiently cured. Spillage or overflow of material onto pavement surface shall be cleaned to the satisfaction of the Engineer.

E. Sealing: Joints and cracks shall be inspected for proper width, depth, alignment and preparation, and must have the approval of the Engineer before sealing is allowed. The pre-packaged sealant mixture shall be placed in the field installation equipment and heated in accordance with the manufacturer's recommendations. The sealant shall not be heated to more than 20°F below the safe heating temperature. The safe heating temperature can be obtained from the manufacturer's shipping container. The sealant shall be applied uniformly at the manufacturer's recommended application temperature from bottom of joint or crack without formation of entrapped air or voids.

PREPARATION AND SEALING OF JOINTS AND CRACKS IN PCC PAVEMENTS

A. Soil Sterilization: A minimum of two weeks prior to scheduled routing, cleaning, filling and sealing of joints and cracks, the Contractor shall apply a mixture of herbicide and soil sterilant chemicals to vegetated areas of pavement. If, at the time the Contractor plans to start cleaning operations, chemicals have not performed to the Engineer's satisfaction, a second application of chemicals shall be applied by the Contractor and the cleaning operations delayed until authorized by the Engineer.

B. Remove Existing Sealant: The existing sealant in the joints is to be completely removed. The Contractor shall exercise utmost care in this removal (and cleaning) operation to minimize damaging or excessively enlarging the existing width of the joint. Any damaged areas are to be repaired by the Contractor at no cost to the Department or Airport Owner.

C. Determine Depth of Joint: The depth of joint required shall be determined to provide the specified recess depth, depth of sealant, and thickness of backer-rod for the joint. (The thickness of the backer-rod will be greater after squeezing it into the joint. Allow for this in determining depth of joint required.) If necessary, the Contractor shall saw the existing joint deeper and wider to provide the required depth and width of joint specified on the plans.

D. Cleaning the Joint: The joint shall be thoroughly cleaned of all foreign material (oil, asphalt, curing compound, sealant adhesive, paint, rust, etc.), including existing sealant if still present. The Contractor shall demonstrate to the Engineer that the proposed method of cleaning old sealants or foreign material from joints shall not widen the joints by more than 0.04 inches. In addition, the method shall not alter the joint profile including rounding on the top comer, or alter the texture of the concrete riding surface. Cleaning of the joint using chemical agent shall not be allowed. The cleaning process shall produce a new, clean concrete face on the vertical faces of the joint.

E. Routing Random Cracks: Cracks having an average width opening less than ½ inch shall be cut to allow for the specified recess depth and depth of sealant shown in details. Cracks where spalling has taken place shall have all broken chunks of concrete removed before routing and then routed in the valley of the spalled portion along the main crack.

F. Installing Backer-Rod in Joint: Prior to placing the backer-rod, the joint must be thoroughly dry and clean. Any necessary cleaning, air blasting or air-drying shall be completed before placing backer-rod (and sealant). On joints where backer-rod is to be installed, a round backer-rod of resilient material, compatible with the joint sealant, and slightly oversized to prevent movement during the sealing will be installed in the joint at the depth specified on the appropriate joint detail in the plans. (The thickness of the backer-rod will be greater after squeezing it into the joint and some "rebound" may occur.

Allowance must be made for this to insure placing at correct depth.) On joints wider than one inch, a back-up material cut from an approved resilient material, compatible with the joint sealant, may be used to fit properly into the joint.

G. Installing Joint Sealant: Joints shall be sealed as soon after completion of joint preparation and installation of backer-rod as reasonably possible to insure that joint is still clean and dry. Prior to sealing, joints shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the Engineer.

In the event the joint becomes contaminated, damp, or wet, the backer-rod is to be removed, the joint cleaned and dried, and a new backer-rod reinstalled prior to placing the sealant material..

Sealing of joints and cracks shall not be allowed when the joint or crack is not thoroughly dry or rain is imminent or when the temperature of the pavement surface and air is below 40°F.

1. ASTM D3405 - Joint Sealants, Hot Poured for Concrete and Asphalt Pavement: The prepackaged sealant mixture shall be placed in the field installation equipment and heated in accordance with manufacturer's recommendations. The sealant shall not be heated to more than 20°F below the safe heating temperature. The safe heating temperature can be obtained from the manufacturer's shipping container. The sealant shall be applied uniformly at the manufacturer's recommended application temperature from bottom of joint or crack without formation of entrapped air or voids. Sufficient amounts of sealant shall be placed into the joints so that upon completion of the work, the sealant shall be at the specified depth. The Contractor shall "spot up" or refill all unsatisfactory joints or cracks. Any excess sealant on the surface of the pavement shall be removed leaving the surface in a clean condition.

   If the sealant material indicates any tendency to pick up under traffic, the sealed joints and cracks shall be sanded. After the sealant material has cured, all sand shall be removed so that the surface is clean.

2. Low Modulus Silicone Sealant: The silicone sealant shall be pumped directly into the joint by use of an air-powered pump. The pump shall be of sufficient capacity to deliver the necessary volume of material to completely fill the joint to the specified width and height of sealant in one pass. The nozzle shall be of sufficient size and shape to closely fit into the joint with sufficient pressure to prevent voids occurring in the sealant and to force the sealant into contact with the joint faces. Immediately after placement and before a skin forms, the sealant shall be tooled to provide the specified recess depth, thickness and shape of sealant as shown on the plans. Sufficient force or pressure shall be applied to the sealant in this tooling operation to force the sealant against the joint faces to insure satisfactory wetting and bonding of the sealant to the joint faces. (The silicone sealant is not self-leveling and will not position itself correctly in the joint under its own weight.) The sealant shall be placed in reasonably close conformity with the dimensions and shape shown on the plans. Any unreasonable deviation will be cause for rejection and necessary corrective action will be taken by the Contractor.

H. Cleaning Pavement: After a joint has been sealed, all surplus sealant or other residue on the pavement surfaces shall be promptly removed.

408.05 FIELD TEST: Prior to full production, the Contractor shall demonstrate that the equipment and procedures for preparing, mixing, and placing the sealant will produce a satisfactorily sealed joint. The area for the field test shall be designated by the Engineer and shall be not less than 200 lineal feet. The equipment, method of operation, and material used on the field test shall be used on the remainder of the work.

If the field test should prove to be unsatisfactory, the necessary correction to material, equipment and/or procedures shall be made. Additional test sections shall be placed and evaluated as required.

408.06 CERTIFICATION: Each lot or batch of sealing compound shall be delivered to the job site in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, and the safe heating temperature and shall be accompanied by the manufacturer's certification stating that the compound meets the requirements of this special provision.

In addition to the certification, the manufacturer may be asked to furnish samples of the sealant and/or copies of the test results to the Department's Office of Materials and Research.

408.07 ACCEPTANCE: In addition to meeting the requirements of this special provision, the manufacturer must also show evidence of successful field installation and performance under similar environmental and project conditions. Even though a sealant meets all requirements, failure to perform adequately in actual use shall be just cause for rejection.

408.08 MEASUREMENT: Joints and cracks sealed in accordance with this special provision and plan
details will be measured in linear feet.*

408.09 PAYMENT: Payment shall be made at the contract price bid for satisfactorily sterilizing, preparing, cleaning, routing, filling, sealing and sanding, as required, of all specified cracks and joints. Such payment shall be full compensation for furnishing all materials and for all labor, tools, equipment, and incidentals necessary to perform this work in accordance with this special provision to the satisfaction of the Engineer.

Payment will be made under:

Item No. 408 Joint and Crack Cleaning and Sealing in Asphalt Pavement - per linear foot

Item No. 408 Joint and Crack Cleaning and Sealing in Asphalt Pavement - per lump sum

Item No. 408 Joint and Crack Cleaning and Sealing in PCC Pavement – per linear foot

*Work will not be measured if payment is to be made per lump sum.